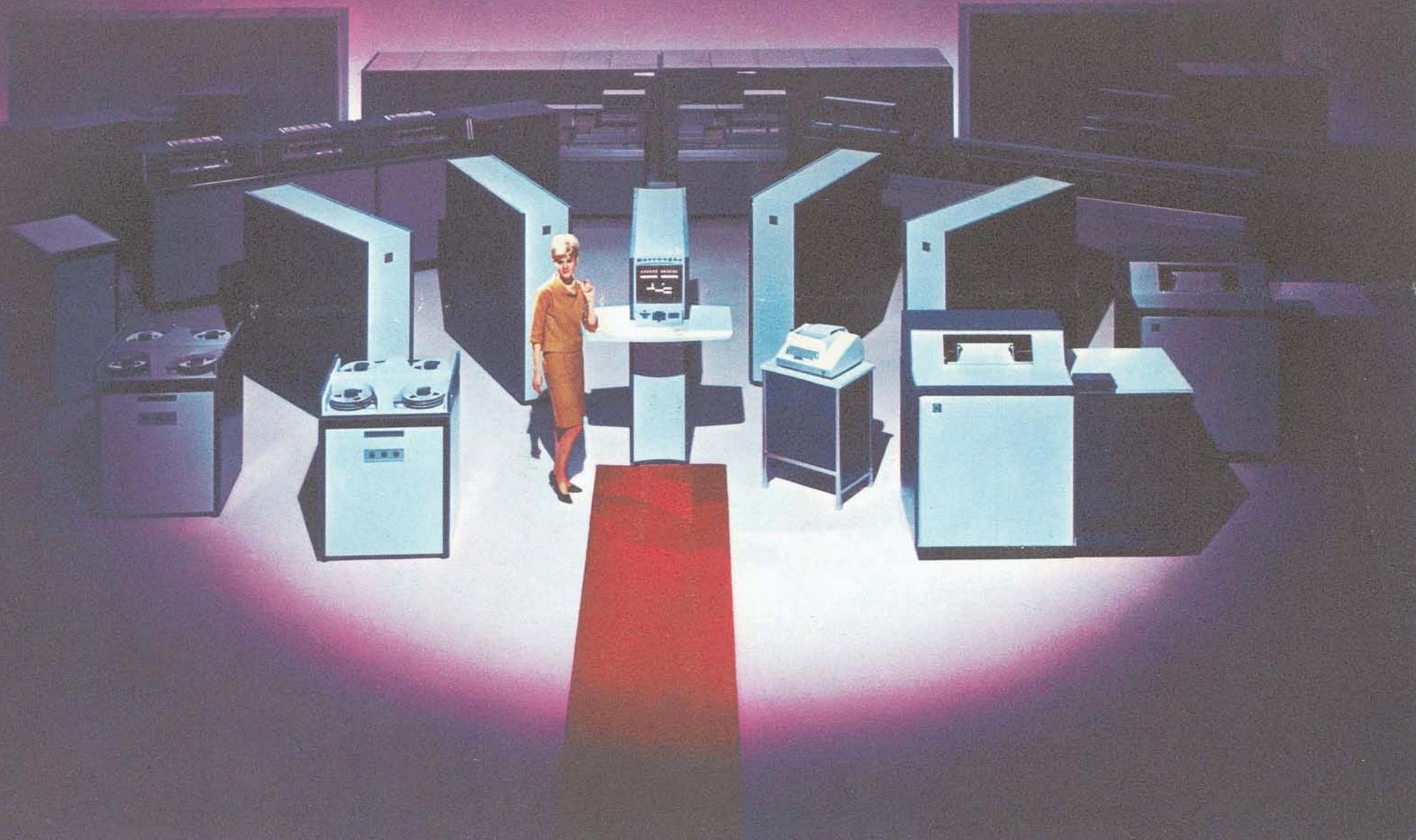


# Burroughs B2500 AND B3500 ELECTRONIC DATA PROCESSING SYSTEMS

A NEW LEVEL OF COMPUTER RESPONSIVENESS



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# Burroughs B 2500 and B 3500

## ELECTRONIC DATA PROCESSING SYSTEMS

Burroughs B 2500 and B 3500 EDP Systems, newest of the Burroughs 500 Systems, constitute a new milestone in the brief but eventful history of electronic computers.

Never before has a computer manufacturer offered such a high degree of simultaneity of operation, self-regulation, strength of software, or sheer computer power and speed at such modest prices.

Never before has a comprehensive, full-scale automatic operating system been offered with computer systems in the lower and medium price range.

Never before have such economically priced computer systems been available with such a full measure of *responsiveness* to the



changing needs of the computer-using organization ; responsiveness found heretofore only in two earlier Burroughs 500 Systems:

the Burroughs B 5500, which established the value of integrated hardware/software design and, after four years, is still unmatched by the newest generation computers which are modeled after it; and

the Burroughs B 8500, most powerful computer system ever designed.

Now, this new level of computer responsiveness to business and scientific problems is available to even the smallest organization with a requirement for electronic data processing.

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### REPRESENTATIVE CONFIGURATIONS OF THE B 2500 and B 3500

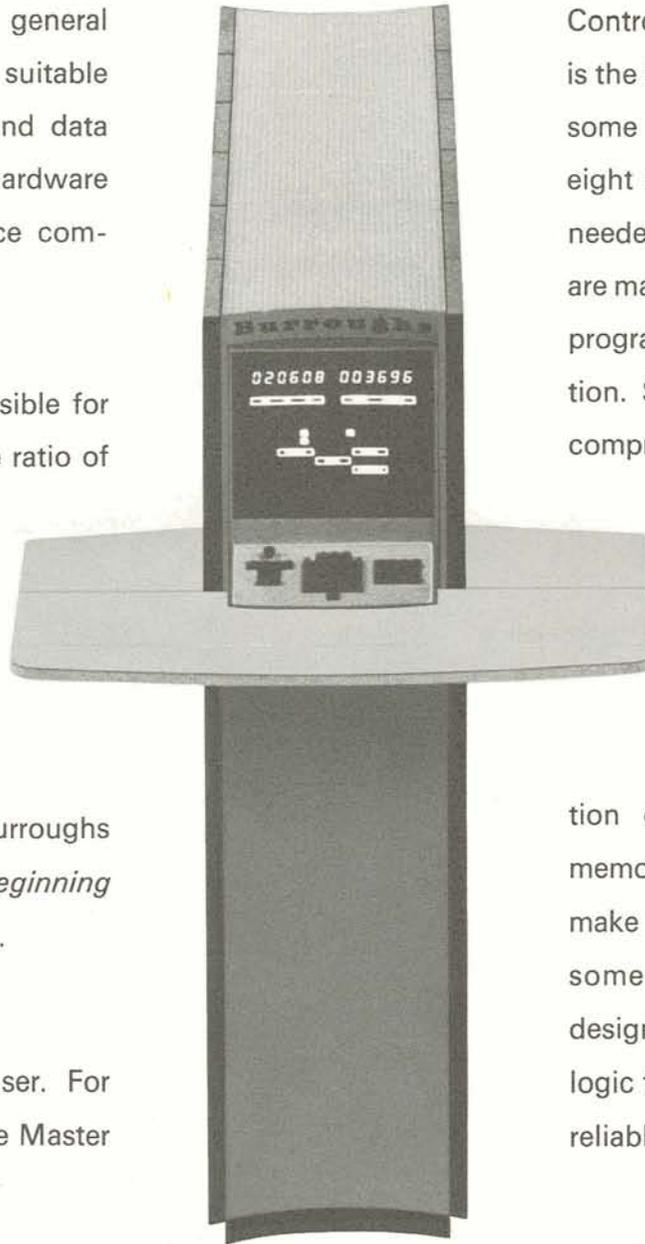
1. Small magnetic tape system
  2. Large random access system
  3. Item processing and demand deposit accounting system
  4. Medium random access system
  5. Small random access system
  6. Disk item processing system
  7. On-line banking system
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# LOW COST, HIGH PERFORMANCE, RESPONSIVENESS TO CHANGE ...RESULTS OF A BETTER WAY TO BUILD COMPUTERS

The Burroughs B 2500 and B 3500 are general purpose digital electronic computer systems suitable for a wide range of business, scientific, and data communication tasks. In every measure of hardware and software performance, they far outpace comparably priced computer systems.

Two major factors are among those responsible for the exceptionally high performance-to-price ratio of the B 2500 and B 3500. The first is a design principle common to all Burroughs 500 Systems. In 1960, Burroughs Corporation determined that in the future, computer performance would depend as much on software as on hardware. Events have proved this to be true. For this reason, *every* Burroughs 500 System has been *designed from the beginning* by *teams* of engineers and software experts.

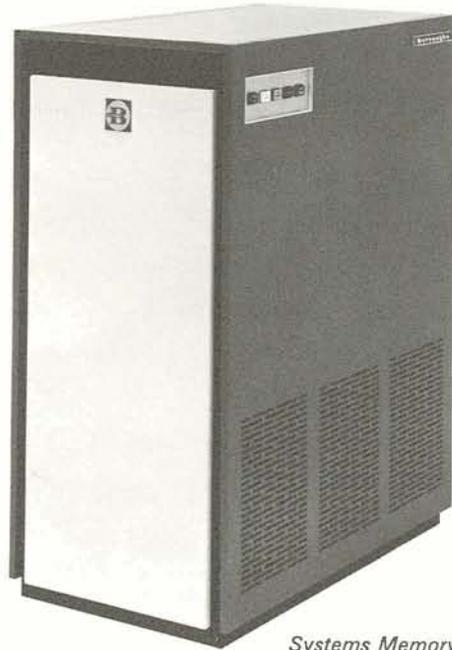
Many economies have resulted for the user. For example, to duplicate the performance of the Master



Control Program for the B 2500 and B 3500, which is the full-scale operating system for both computers, some other computer systems require as much as eight to twelve *times* the amount of main memory needed in the new Burroughs systems. Other gains are made in compiling times, operating system power, programing ease, and speed and efficiency of operation. Such gains are seldom achieved through the compromises found in conventional computer design, where software writers must build a bridge of communication between a static, final equipment design and the human user.

A second major factor is the use of monolithic integrated circuitry in construction of virtually all logic and the two control memories. The Burroughs B 2500 and B 3500 make use of complementary transistor logic, plus some use of array monolithics—two proven design concepts at the forefront of this newest logic technology. The results are smaller, faster, more reliable circuits at lower costs.

THE **Burroughs**  
**B 2500 and B 3500**  
 HAVE THE  
 FOLLOWING  
 CHARACTERISTICS:



*Systems Memory*

- Ability to expand Main Memory, Address Memory, Read-only Memory, I/O Channels, peripheral configuration—anything short of a change in basic method of processing—without reprogramming. Advancing from the B 2500 to the B 3500 is just as simple, since both systems use the same processor design, instruction codes, peripherals, and software.
- Ability to expand Main Memory in economical increments: B 2500, 10,000 to 60,000 bytes in increments of 10,000; B 3500, 10,000 to 500,000 bytes in an initial nine increments of 10,000 bytes plus eight larger increments.
- Three types of very fast standard memories in the Central Processor:

| Type             | Function                          | B 2500                 | B 3500                 |
|------------------|-----------------------------------|------------------------|------------------------|
| Main Memory      | Program area                      | 2 us cycle,<br>2 bytes | 1 us cycle,<br>2 bytes |
| Address Memory   | Multiple simultaneous I/O control | 100 ns access          | 100 ns access          |
| Read-only Memory | Instruction execution             | 100 ns access          | 100 ns access          |

- Multiple Input/Output Channels with data transfer rates of up to 2 million bytes (4 million digits) per second. Up to six channels are available with the B 2500; up to 20 with the B 3500.
- Multiple read/write/compute on single programs, plus broad multiprocessing and time sharing capabilities. Up to six simultaneous read/write operations may occur simultaneously with processing on the B 2500; on the B 3500, up to 20.
- Head-per-track disk Systems Memory, available in capacities of 1 million to 4 million bytes, with all-electronic average access time of 17 milliseconds.

- Up to 2.5 billion bytes of capacity in random access, head-per-track disk file with all-electronic average access time of 20 milliseconds. Optional I/O Exchange permits fully simultaneous use through up to four I/O Channels. Disk file memory is available in increments of 10 million bytes.
- Basic and Master Control Programs that optimize and simplify system operation and programing.
- Positive hardware memory protection for each program.
- Three index registers per program, regardless of the number of programs being multiprocessed.
- Indirect addressing and indirect field length for greater programing flexibility.
- Variable-length zero-, one-, two-, or three-address instructions which provide greater programing power while optimizing memory utilization for programs.
- Digit, byte, or word (two bytes) addressing. A byte (eight bits) may represent two digits or one character.
- Instructions which work with a combination of digits and bytes without conversion, providing automatic packing and unpacking for optimum memory utilization for data.
- Ability to move from one digit to 20,000 bytes with one instruction.
- Simplified decimal arithmetic, faster than comparably-priced binary address machines. A 5X5 fixed point decimal add, including fetch, execute and store, takes only 64 us on the B 2500, 32 us on the B 3500.
- Powerful floating point arithmetic capability (optional).
- Automatic interrupt system.

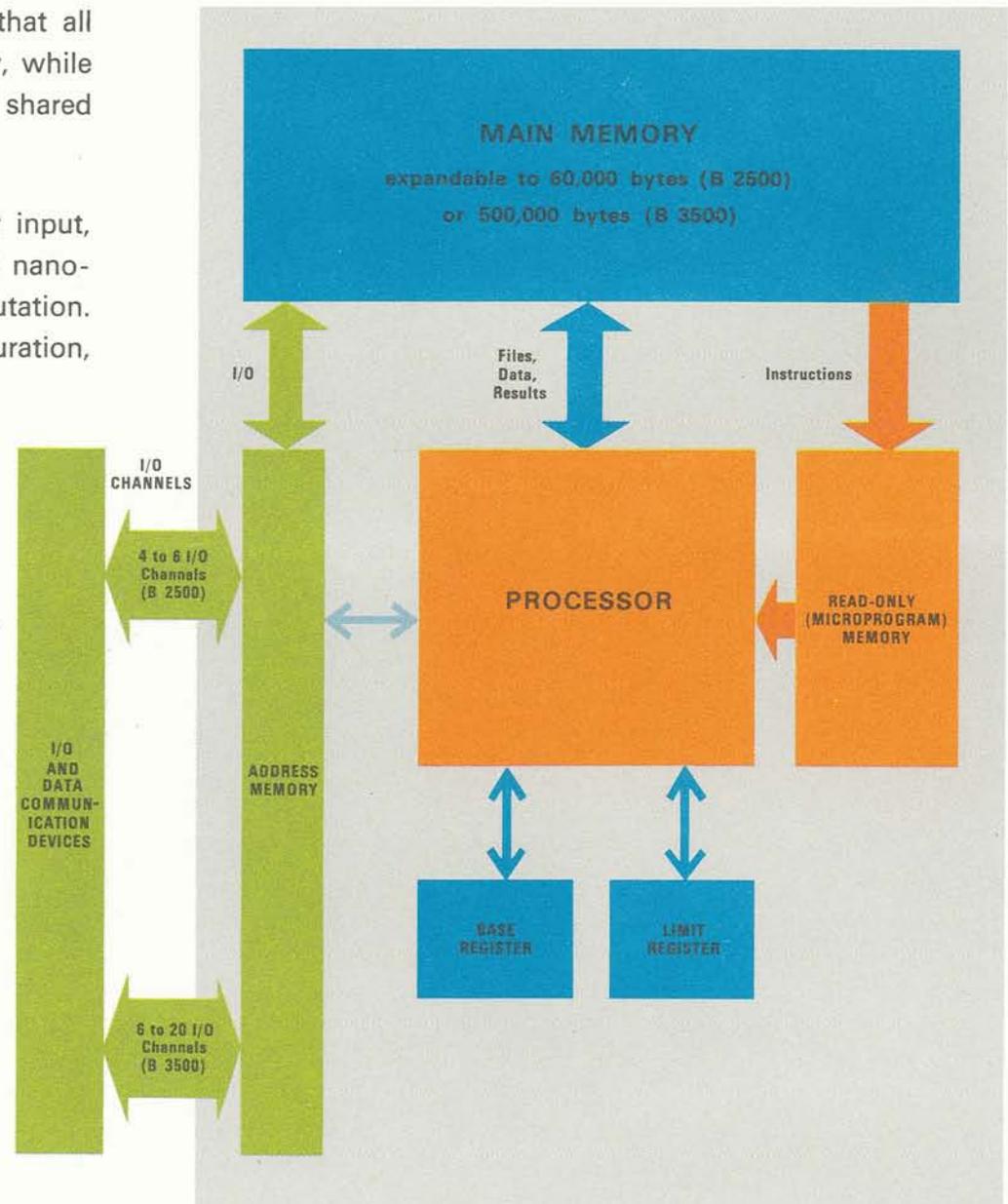
# ORGANIZATION OF THE Burroughs B 2500 and B 3500

This simplified block diagram illustrates the internal organization of the B 2500 and B 3500. The basic mode of operation is such that all Input/Output Channels can be transferring data simultaneously, while processing also proceeds concurrently. Main memory is time shared among the individual channels and the processor.

Address Memory maintains control over memory accesses for input, output and processing, and operates at the high speed (100 nanoseconds) required for complete simultaneity of I/O and computation. Modularly expandable to accommodate changes in configuration, it replaces virtually all "hard registers" found in more conventionally designed computers.

Also operating at 100 nanoseconds in both systems, Read-only Memory replaces much of the wired logic (particularly duplicate circuits) of conventional computers. Its basic function is to translate B 2500 and B 3500 instructions into individual micro-operators for execution by the processor. Its modular expandability allows its use, as well, to perform similar translations required in the emulation of Burroughs B 200/B 300 and IBM 1401/1440/1460 computer systems, easing conversion by providing the capability of accepting programs written for those systems.

The Base and Limit Registers are associated with each program (and its data) currently in main memory, and specify the block of memory reserved to the job by the operating system. The result is positive hardware memory protection, allowing multiprocessing and time sharing without the danger of interference between programs.



# A BROAD RANGE OF INPUT/OUTPUT AND DATA COMMUNICATIONS DEVICES



*Magnetic Tape Cluster*

Selection of optimum system configurations of the Burroughs B 2500 and B 3500, to meet today's and tomorrow's needs, may be made from a wide range of I/O and data communications devices.

## **MAGNETIC TAPE UNITS**

Perhaps the most revolutionary new peripheral unit developed for the B 2500 and B 3500 is the Magnetic Tape Cluster, a small device housing two, three or four magnetic tape stations. Seven-channel units are available with recording densities of 200, 556 and 800 frames/inch and reading and writing speeds of 9 KC, 25 KC and 36 KC. Nine-channel units have recording densities of 800 and 1600 frames/inch and read/write speeds of 36 KB and 72 KB. This new design concept for magnetic tape units results in great reliability and low cost.

Conventional Magnetic Tape Units are available with the following specifications:

Seven-channel, 200/556 frames/inch, 18/50 KC

Seven-channel, 200/556/800 frames/inch, 18/50/72 KC

Nine-channel, 800 frames/inch, 72 KB

Nine-channel, 1600 frames/inch, 144 KB

## **CARD READERS**

Available in three models, with speeds of 200, 800 and 1400 cards per minute.

## **CARD PUNCHES**

Available at 100 and 300 cards per minute.

## **MICR DOCUMENT SORTER-READERS**

Available in 13-pocket and 16-pocket versions, at 1565 documents per minute.

## **PAPER TAPE READER AND PUNCH**

Reader speed: 500 and 1000 characters per second. Punch speed, 100 characters per second.

## **LINE PRINTERS**

Available in four models with printing speeds ranging from 700 to 1040 lines per minute. 120 print positions/line standard, 132 optional.

## **MULTIPLE TAPE LISTER**

Available with six, twelve, or eighteen individually-controlled listing tapes ; prints at 1565 lines per minute.

## **DATA COMMUNICATION, REAL TIME, TIME SHARING**

Under operating system control, data transmitted from remote card readers, paper tape readers, teller consoles, data collection devices, Teletypewriters, or satellite computers is processed against the appropriate object program and results are transmitted back to the originating station or other stations specified by the program. This quick response may occur without interference with other work being processed.

The B 2500 and B 3500 possess interface capabilities to a very large selection of data communications devices and services through Line Adapters which may be connected to I/O Channels singly or through Multiple Line Controls. Any I/O Channel, or group of Channels, may be used for data communications. Through use of a Multiple Line Control, one I/O Channel can handle up to 36 high speed communications lines.

Like virtually every other portion of the modular B 2500 and B 3500, Line Adapters and Multiple Line Controls may be added or changed on site at any time.

## **RANDOM ACCESS DISK FILE STORAGE**

Two head-per-track disk files are offered with the B 2500 and B 3500. Both share the common design principle of a permanent read/write head positioned over each information track. The result is all-electronic access, significantly faster and more flexible than conventional disk files.

Systems Memory is available with one, two, three or four million bytes of disk storage. Average access time is 17 milliseconds. Designed to house the MCP and program library, Systems Memory is also available for random access storage of data.

The Burroughs On-Line Disk File, with an average access time of 20 milliseconds, is available in modules of 10 million bytes to a maximum capacity of 2.5 billion bytes.

In addition to speed and flexibility, both disk files feature exceptional reliability, since access is by electronic switching.

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# SOFTWARE . . . FULL PARTNER IN COMPUTER POWER AND RESPONSIVENESS

Much of the responsiveness and high performance of the Burroughs B 2500 and B 3500 results from powerful software, developed concurrently with the hardware design for optimum efficiency. Just as decimal notation, arithmetic and display help make the new systems easier to understand and work with, their software greatly simplifies programing and operation.

## OPERATING SYSTEMS

Two operating systems are provided with the B 2500 and B 3500. For smaller configurations not intended for multiprocessing use, the Basic Control Program may be used for automatic program loading and control of input/output.

The Master Control Program is a comprehensive operating system requiring only 10,000 bytes of main memory plus 70,000 bytes of either disk Systems Memory or the larger Burroughs On-Line Disk File. Among the many facilities provided by the MCP are:

- Automatic program and data library maintenance
- Automatic memory and I/O allocation
- Automatic program scheduling
- Automatic program loading
- Automatic I/O initiation
- Automatic error handling and recovery
- Automatic overlay of program segments
- Automatic rescheduling and adjustment of program mix and memory allocation (dynamic, non-stop multiprocessing), to reflect changes in priority or job mix
- Automatic adjustment of programs for optimum use of changed hardware configuration
- Automatic log preparation, including distribution of I/O and processor time to multiprocessed jobs
- Automatic diagnostic and testing aids
- Automatic communication of instructions to operator

Based on the highly regarded Master Control Program for the larger Burroughs B 5500, in successful operation throughout the country, the MCP for the B 2500 and B 3500 is one of the most powerful aids to full computer system utilization and management ever developed.

## PROGRAMING LANGUAGES

The responsiveness to user needs found in these two new Burroughs computer systems is evidenced in the ease with which they may be programed. The power inherent in their simplified command set is seen in such features as the ability to MOVE from one digit to 20,000 bytes with one command—or to ENTER and EXIT from subroutines, including all detail housekeeping and permitting stack operations and recursive entry, with one instruction.

Two problem-oriented languages are offered with the B 2500 and B 3500: COBOL and FORTRAN. The languages themselves offer proven value in speeding the preparation of programs, and reducing costs of programing, by as much as 50 per cent. They also broaden the direct usability of the computer, for business and scientific problem solving, to individuals and departments outside the computer room. With the B 2500 and B 3500, it is possible to routinely compile one or both types of programs simultaneously with each other and with a mix of production work.

Other programing languages include two Assemblers, which include a powerful list of macro instructions, and two Report Program Generators, for quick programing of simple routines.

## UTILITY PROGRAM GENERATORS

Because each installation—and each problem—has different processing requirements, program generators are provided for media conversion and sort/merge operations. As a result, each user may quickly and simply generate as many or as few utility programs as his current and future workload dictates. The generated programs are tailored to the specific job, thus further optimizing over-all system performance.

